a second shoe disposed on the second arm to contact a tight strand of the chain, the second shoe disposed outside the tight strand and positioned to received the tight strand along a substantial length of the second shoe;

the rotatable body of the actuating hydraulic tensioner movable about the pivot point to urge the first and second shoes laterally inward, relative to the chain to impart tension to said chain.

REMARKS

Upon entry of the present amendment, claims 1-19 are pending, claims 20-23 have been restricted, and claims 1-19 and 24-28 are presently pending.

Attached hereto, and submitted under separate cover, is a proposed drawing change as suggested by the Examiner. The Examiner's approval is respectfully requested.

The Examiner's indication that claims 5, 7, 9, 12 and 18 would be allowable if rewritten to overcome the rejections under 35 U.S.C. 112, second paragraph, and to include the limitations of the base and any intervening claims is noted with appreciation. Claims 5, 7, 9, 12 and 18 have been rewritten as claims 24-28, respectively.

The specification stands objected to. The informalities noted in the Office Action have been corrected upon entry of the present amendment.

Claims 4, 5, 9, 10 and 14 stand objected to. The informalities noted in the Office Action have been corrected upon entry of the present amendment.

Claims 1-19 stand rejected under 35 U.S.C. 112, second paragraph, as being indefinite due to informalities on the claim language. Claims 1-19 have been amended to clarify the claim language to address that rejection as well.

Claims 8, 10, 11 and 13 stand rejected under 35 U.S.C. 102(b) as being anticipated by JP60-65945 to Minoru. Applicants respectfully submit that Minoru does not disclose the invention of the pending claims 8, 10, 11 and 13, and that therefore these claims should be allowed.

Minoru discloses a threaded, screw type tensioner that relies on "uncoiling" of an exterior mounted coil spring to press an arm member in the direction of a chain. Applicant respectfully submits that the Office Action mistakenly interprets Minoru in an important respect. The Office Action suggests, p. 5, that Minoru discloses that a "first chamber is disposed to move the rotatable body about the pivot point when pressurized by the hydraulic fluid and a tension arm (12) operatively connected to the rotatable body with a frictional contact surface (7) position to contact and tension a chain when pressurized by the hydraulic fluid."

Minoru, however, operates by requiring rotation of the threaded inner section outward and away from the stationary section by the uncoiling of the spring. The hydraulic fluid then fills a chamber within the device. (See translated Abstract and Figure 2). As the chain or belt in Minoru requires additional tension, the threaded inner section is moved by the uncoiling spring to project further and further from the stationary outer section, utilizing its threads and hydraulic fluid to resist pressure from the chain.

Thus, Minoru actually relies on three structures to provide and maintain tension in its system: a coil spring, the hydraulic fluid, and the screw threads. Moreover, Minoru is ill suited for confined spaces as it requires additional space to provide for the increasing and significant extension of its inner section, as well as a limitation on direction of tensioning force, i.e. only along the longitudinal axis of the tensioner.

Applicants respectfully submit that Minoru does not disclose or suggest the claimed tensioner which is adapted for confined spaces, and is more flexible in terms of the direction of tension force that may be applied, depending on its alignment relative to a chain strand. Applicants submit that Minoru does not disclose or suggest the invention of Claims 8, 10-11, and 13.

Claims 1-4 and 6 stand rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 1,581,624 to Wunderlich et al. in view of Minoru. Applicants respectfully submit that Minoru and Wunderlich et al. do not disclose or

suggest the invention of Claims 1-4 and 6, and that therefore these claims should be allowed.

As discussed above, Minoru does not disclose or suggest Applicants' tensioner. Wunderlich also does not teach or suggest the system or tensioner of the invention. Wunderlich relies on a member revolved by a crank or wrench, or "might be provided with a spring". Wunderlich does not suggest the use of any hydraulic fluid or fluid chamber. Furthermore, Applicants' respectfully submit that the Office Action incorrectly characterizes Wunderlich by referring to "actuator (20) for actuating the arms (21-23)." Wunderlich's "member 20" is a rachet and pawl system that is intended to provide kick back resistance, and does not rotate Wunderlich's tensioner.

In addition, there is no suggestion or motivation to combine Wunderlich and Minoru. Indeed, in view of the requirement for the substantial extension of the inner section, and longitudinal movement of Minoru inner section, there is no basis for assuming that Minoru would provide the rotational movement of the tensioner required by Wunderlich. Thus, taken separately or together, the references do not suggest the invention of Claims 1-4 and 6.

Claims 13-17 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Wunderlich et al. in view of Minoru. In view of the above-discussed deficiencies in both Minoru and Wunderlich et al., applicants respectfully submit that Minoru and Wunderlich et al. do not teach or suggest the invention of Claims 13-17, and that therefore these claims should be allowed.

For the reasons set forth above, Applicants respectfully submit that all of the pending claims are in condition for allowance. Reconsideration and allowance of the application are respectfully requested.

Attached hereto is a marked-up version of the changes made to the claims by the current amendment. The page is captioned "VERSION WITH MARKINGS TO SHOW CHANGES MADE."

Respectfully submitted,

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE SPECIFICATION:

The paragraph beginning at page 1, line 8, has been replaced with the following amended paragraph:

--Chain tensioning devices are used to control power transmission chains as the chain travels between a set of sprockets. Such chains usually have at least two separate strands, spans or lengths extending between the drive sprocket, such as a crankshaft sprocket, and the driven sprocket, such as a cam sprocket. The strand between the sprockets where the chain leaves the driven sprocket and enters the drive sprocket is frequently [is] under tension as a result of the force imposed on the chain by the drive sprocket. The strand between the sprockets where the chain leaves the drive sprocket and enters the driven sprocket is frequently under reduced drive tension or slack due to the absence of driving force exerted on that strand. In systems with large center distances between the sprockets, both strands may evidence slack between the sprockets.--

The paragraph beginning at page 2, line 15, has been replaced with the following amended paragraph:

--To maintain tension in such transmission systems, tensioner devices have been used to push a tensioner arm against the chain along a chain strand. Such transmission systems[,] typically press on the chain mechanically deflect the strand path imparting under the desired degree of tension on the chain. Current tensioner devices for performing this function, such as torsion spring tensioners, utilize the energy stored in a wound spring to drive the tensioner arm, such as shown in Ojima, U.S. Pat. No. 5,030,170. The small size of torsion spring tensioners makes them highly suitable in

many situations. However, they often require an excessive spring load to effectively dampen chain vibrations and maintain a constant spring tension.--

The paragraph beginning at page 13, line 8, has been replaced with the following amended paragraph:

--Figure 9 is a sectional top view of the rotary actuating tensioner through the lines [9-9] IX-IX shown in Figure 8 indicating the rotary motion of the device and the fluid and air chambers of the tensioner.--

The paragraph beginning at page 13, line 14, has been replaced with the following amended paragraph:

-Figure 11 is a view of the rotary actuating tensioner through line [11-11] XI-XI of Figure 7 showing the hydraulic fluid inlet and check valve assembly.--

The paragraph beginning at page 16, line 14, has been replaced with the following amended paragraph:

--Additionally, the configuration of this aspect of the rotary [actuation] actuating tensioner 18 provides superior dampening of chain vibration by eliminating the need for the previously discussed independent lever mechanisms and by coupling the two tensioner arms 20 and 22 directly to the rotary actuating tensioner 18. Thus, vibration in a first strand of chain, whether strand 24(a) or 24(b), is transferred and damped by the action of the second strand through the rotary actuating tensioner 18.--

The paragraph beginning at page 17, line 1, has been replaced with the following amended paragraph:

--Referring to the figures to describe the two principle parts of the [actuator] rotary actuating tensioner 18 in greater detail, Figure 2 depicts one aspect of a tensioner arm 20 in front view. The first and second arms (20 and 22 as shown in Figure 1) are identical in structure but have a different orientation in operation, determined by the direction of chain travel. This aspect of the tensioner arm 20 has an elongated bracket portion 48 with a bore 50. The bore 50 is slightly offset toward the leading end of the bracket portion 48 of the tensioner arm 20. More particularly, the bore 50 is offset toward the end of the arm 20 nearest the incoming chain.--

IN THE CLAIMS:

Claims 1, 2, 4-8, 10-14 and 18 have been amended as follows:

1. (Once Amended) A power transmission chain and tensioner for an automotive system application, said chain tensioner and power transmission chain system comprising:

a plurality of sprockets including at least one driving sprocket connected to a power input and at least one driven sprocket connected to a power output;

a chain wrapped around the plurality of sprockets, the chain including at least a first stand portion having some of links being pulled by the driving sprocket and a second strand portion having some links pulling the driven sprocket;

a hydraulic fluid source for the pressurized flow of [the] hydraulic fluid;

a rotary actuating hydraulic tensioner having a stationary portion and a rotatable body in operative relation to the stationary portion, the rotatable body movable in a generally planar rotation about a central pivot point and in flow communication with the hydraulic fluid source; and

the rotatable body having an outer face provided with at least one tensioner arm operatively connected thereto, the tensioner arm having a friction surface positioned in contact with at least one of the chain strands to exert force on the strand, and the hydraulic fluid pressure within the rotary tensioner effective to maintain the rotatable

body in a position to hold the friction surface against the strand with sufficient force to provide tension in the chain.

2. (Once Amended) The system of claim 1 wherein the rotatable body is biased by force from one or more springs to rotate about the central pivot in a first direction moving the tensioner arm friction surface against the chain strand and the hydraulic fluid provides biasing pressure within the rotary tensioner effective to resist the movement of the rotatable body in a reverse, second direction due to pressure against the tensioner arm by the strand.

4. (Once Amended) The system of claim 2 wherein the stationary portion[s] of the tensioner includes a central pivot firmly affixed to said stationary portion, the rotatable body is mounted on the pivot within the stationary portion, and the stationary portion has inner surfaces cooperating with surfaces of the rotatable body to form at least one first chamber for receiving the pressurized hydraulic fluid therein, and the rotatable body is provided with abutment surfaces disposed to receive biasing force from one or more of the springs and the hydraulic fluid.

5. (Once Amended) The system of claim 4 wherein the stationary portion and the rotatable body are provided with cooperating surfaces forming at least one second chamber vented to the ambient atmosphere, the venting sized to permit [the] a reversible flow of air and other fluids from the second chamber with the movement of rotatable body around the pivot point.

6. (Once Amended) The system of Claim 4 wherein one or more of the springs and the pressurized hydraulic fluid are disposed within at least one [of] said first chambers; the rotary [actuator] tensioner is provided with a valve limiting the loss of hydraulic fluid from [the] said chamber [first]; and the surfaces of the stationary portion and the rotatable body are generally in sealing relation adjacent to said first chamber[s] effective to limit the loss of hydraulic fluid from [the] said chamber.

7. (Once Amended) The [rotary actuator] system of claim 5 wherein one or more of the springs are disposed in at least one second chamber and the rotary [actuator] tensioner is provided with a valve limiting the loss of hydraulic fluid from the first chamber.

8. (Once Amended) A rotary actuating hydraulic tensioner for maintaining a desired degree of tension in a chain system in an engine comprising,

a stationary housing and a rotatable body disposed within the housing, the rotatable body movable about a central pivot point and in flow communication with a pressurized hydraulic fluid source;

at least one first chamber within the tensioner for receiving the pressurized hydraulic fluid, [the] said first chamber disposed to move the rotatable body about the pivot point in a generally planar rotation when pressurized by the hydraulic fluid, and

at least one tensioner arm operatively connected to the rotatable body with at least one frictional contact surface positioned to contact at least a portion of the chain to exert force on the chain when the rotatable body is moved in a first direction relative to the tensioner arm.

10. (Once Amended) The rotary actuating hydraulic tensioner of claim [11] 8 wherein the hydraulic fluid within the first chamber is generally retained within the first chamber to resist the movement of the rotatable body in a second reverse direction when force is exerted against the tensioner arm contact surface by the chain.

11. (Once Amended) The rotary tensioner [actuator] of claim 10 wherein the tensioner is provided with a valve effective to maintain the hydraulic pressure within the first chamber.

12. (Once Amended) The rotary tensioner [actuator] of claim 10 wherein the tensioner is provided with at least one second chamber vented to the ambient

atmosphere and positioned to evacuate air or other fluids from the second chamber within the rotatable body is moved in the first direction.

13. (Once Amended) The rotary tensioner [actuator] of claim 10 wherein said rotary actuating hydraulic tensioner is positioned between a tight strand and a slack strand of the chain.

14. (Once Amended) A rotary actuating hydraulic tensioner for maintaining a desired degree of tension in a chain system in an engine comprising:

a stationary housing and a rotatable body disposed within the housing, the rotatable body movable about a central pivot point in a generally planar rotation and in a flow communication with a high pressure hydraulic fluid source;

a first arm and a second arm opposite the first arm, each arm movably attached to pin assemblies fixed to the rotatable body;

a first shoe disposed on the first arm to contact a slack strand of the chain, the first shoe disposed outside of the slack strand and positioned to receive the slack strand along a substantial length of the first shoe;

a second shoe disposed on the second arm to contact a tight strand of the chain, the second shoe disposed outside the tight strand and positioned to received the tight strand along a substantial length of the second shoe;

the rotatable body of the actuating hydraulic tensioner movable about the pivot point to urge the first and second shoes laterally inward, relative to the chain to impart tension to said chain.

18. (Once Amended) The actuator of claim [17] 14 wherein the first pin assembly is placed a first distance from the central axis and the second pin assembly is spaced a second distance from the central axis, the first distance being different from the second distance to move the tensioner arms different distances relative to the chain.